

Patent
Attorney's Docket No. 027500-690

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reissue Patent Application of)

U.S. Patent No. 5,088,108)
UDDENFELDT et al.)

Serial No.: 08/136,760)

Filed: October 15, 1993)

For: CELLULAR DIGITAL MOBILE)
RADIO SYSTEM AND METHOD)
OF TRANSMITTING INFORMATION)
IN A DIGITAL CELLULAR)
MOBILE RADIO SYSTEM)

Group Art Unit: 2603

Examiner: B. Safourek

AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In response to the Office Action dated August 11, 1995, kindly amend the
above-identified application as follows:

IN THE CLAIMS:

Please amend claims 10, and 12-14 as follows:

10. (Amended) A cellular mobile radio system for communicating message
information within a geographic area that is divided into communication cells,
comprising:
a plurality of base stations associated with said cells, [some] at least one of
said cells having at least two base stations associated therewith and located a distance

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W. Little
J. Lee
etc

6 ~~from one another to transmit respective radio signals into [a] said at least one cell,~~
7 which signals are digitally encoded with substantially the same message information
8 and are transmitted at the same frequency and substantially simultaneously with one
9 another,
10 each base station including means for digitally encoding the radio signals with
11 message information, said encoding being carried out with modulation time intervals
12 which are within a time interval related to [no longer than] the time required for
13 [audio] radio signals to propagate a distance corresponding to the greatest transmitting
14 distance between said at least two base stations associated with said at least one cell in
15 said system; and
16 a plurality of mobile stations each having means for reconstructing the digital
17 encoding of plural corresponding radio signals respectively received over the same
18 frequency range during a reception time interval from [the] said at least two base
19 stations associated with [a] said at least one cell, which reception time interval is at
20 least as long as the time required for radio signals to propagate a distance
21 corresponding to the greatest transmitting distance between said at least two base
22 ~~stations associated with [a] said at least one cell.~~

In claim 11, delete "predetermined".

In claim 12, line 2, insert -- at least one -- between "said" and "cell".

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In claim 13, line 7, insert -- substantially -- between "with" and "the".

line 8, change "several" to -- a few -- and change "audio" to

-- radio --.

In claim 14, line 6, change "into a cell" to read -- into said cell --.

Please add claims 15-~~21~~²⁰ as follows:

1 --15. The cellular mobile radio system of claim 10, wherein the time interval
2 is less than to a few times greater than the time required for radio signals to propagate
3 the distance corresponding to the greatest transmitting distance between two base
4 stations associated with said at least one cell in said system.

1 16. The cellular mobile radio system of claim 10, wherein said time
2 interval is no longer than the time required for radio signals to propagate the distance
3 corresponding to the greatest transmitting distance between two base stations
4 associated with said at least one cell in said system.

1 17. The cellular mobile radio system of claim 10, wherein said time
2 interval is a few times greater than the time required for radio signals to propagate the
3 distance between two base stations associated with said at least one cell in said
4 system.

1 18. A cellular mobile radio system for communicating message information
2 across an area of coverage, comprising:

3 a plurality of cells, each of said plurality of cells representing a geographic
4 division of said area of coverage;

5 a first base station for transmitting a first signal including message information
6 into at least one of said plurality of cells, said first base station including means for
7 modulating a radio carrier with said message information, said message information
8 being represented by a sequence of symbols;

9 a second base station for transmitting a second signal, including substantially
10 the same message information as transmitted by said first base station, into said at
11 least one of said plurality of cells, said second base station including means for
12 modulating said radio carrier frequency with said substantially the same message
13 information; and

14 at least one mobile station located within said at least one of said plurality of
15 said cells wherein said first and said second signals are received by said mobile
16 station with a time shift therebetween wherein said time shift arises from a difference
17 in a first radio propagation delay between said at least one mobile station and said
18 first base station and a second propagation delay between said at least one mobile
19 station and said second base station during a reception time interval, said time shift
20 being in the range of less than to a few times greater than said difference in radio
21 propagation delays, said at least one mobile station further including means for
22 recovering said message information from said first and said second signals during a
23 reception time interval which reception time interval is greater than said time shift.

1 19. The system of claim 18, wherein said time shift is intentionally
2 introduced in the transmission of said first signal and said second signal.

1 20. The system of claim 19, wherein said first base station and said second
2 base station further include means for shifting the transmission time of said first signal
3 and said second signal, respectively.--

REMARKS:

Claims 1-20 are pending in the present application. The Office Action and cited documents have been considered. Reconsideration and withdrawal of these pending rejections are courteously requested.

Applicants note with appreciation the approval of the drawings submitted on October 15, 1993. Applicants further acknowledge that the original patent is to be surrendered and will forward the original patent in due course.

In paragraph C of the Office Action, the reissue declaration filed with the application has been deemed defective because it purportedly fails to provide a statement that Applicants believe that the original patent to be wholly or partially inoperative or invalid, as required under 37 C.F.R. §1.175(a)(1). A supplemental declaration is submitted herewith which more particularly specifies the defects in the original claims in paragraphs 7-23 that Applicants believe render the original patent partially inoperative and which Applicants believe satisfies the requirements of 37 C.F.R. §1.175(a)(1). In this

regard it should be noted that a failure to claim the invention broadly enough is considered to be a form of partial inoperability. *See* MPEP §1404.01.

In paragraph D, it is stated that the reissue declaration allegedly does not comply with the requirements of 37 C.F.R. §1.175(a)(3) and MPEP §1414.01, for purportedly failing to specify the excesses or deficiencies in the claims. Specifically, the Examiner has requested more specificity in identifying the differences between the newly submitted claims 11-14 and the original claims 1-10. A supplemental declaration is submitted herewith which Applicants believe satisfies the requirements of 37 C.F.R. §1.175(a)(3) and MPEP §1414.01.

In paragraph E, the reissue declaration also has been deemed defective because it purportedly fails to particularly specify the errors relied upon by Applicants, and/or how such errors relied upon arose or occurred, and how and when such errors were discovered, as required under 37 C.F.R. §1.175(a)(5). A supplemental declaration is submitted herewith which Applicants believe satisfies the requirements of 37 C.F.R. §1.175(a)(5). In particular the newly submitted reissue declaration specifies how each of the declared errors was discovered and how each occurred.

As a consequence of the objections to the reissue declaration, claims 1-14 stand rejected under 35 U.S.C. §251 as being based on an allegedly defective reissue declaration. Applicants respectfully submit that this ground of rejection is overcome by the Supplemental Declaration and the foregoing comments. Accordingly, reconsideration and withdrawal of this ground of rejection are respectfully requested. Should the

Examiner have any remaining problems with the reissue declaration, he is respectfully requested to specifically identify the type of language desired for the declaration.

The specification has been objected to under 37 C.F.R. §112, first paragraph as purportedly failing to provide an enabling disclosure. Consequently, claims 10-14 also have been rejected under 35 U.S.C. §112, first paragraph. In particular, the Office Action indicates that the term "audio" that appears at line 11 of claim 10, and at line 8 of claim 13, is not supported by the original disclosure. This term was introduced by clerical oversight and has been corrected to --radio-- in both instances. The appearance of the term "audio" also formed the basis for a rejection under 35 U.S.C. §112, second paragraph later in the Office Action. Applicants believe that amending the term "audio" to --radio-- also remedies the rejection under 35 U.S.C. §112, second paragraph.

The Office Action also rejected, as non-enabled, the phrase "predetermined time interval related to" at line 10 of claim 10. This language has been amended to --time interval related to-- which Applicants also believe is fully supported by the original disclosure as discussed in the following. As noted by the Examiner, column 10, line 10 of Applicants' patent provides support for a modulation time interval being "a few times greater" than the time it takes for radio signals to propagate a distance between two base stations. Additionally, Applicants direct the Examiner's attention to column 9, line 66 through column 10, line 3 of the patent, where a modulation time interval is disclosed which "can be of the same order of magnitude as the time it takes for radio signals to propagate a distance just as long as the greatest transmitting distance between two base station transmitters serving the same cell within a particular area." Shortly thereafter, at

column 10, lines 6-8 the patent discloses "...the present invention has its greatest importance when the modulation time interval is less than the mentioned propagation time,..." which supports the modulation time interval being less than the propagation time. Thereafter it is disclosed that the invention can have substantial advantages even when the modulation time interval is "a few time greater than the mentioned propagation time" which was noted by the Examiner as described above in support of a modulation time interval greater than the aforementioned propagation time. Applicants further direct the Examiner's attention to column 2, lines 52-56 where Applicants state: "The digital modulation is changed with a modulation time interval which is adapted to the greatest transmitting distance between two base station transmitters serving the same cell in an area."

It is clear that each of the above cited portions of the patent are examples of relative time relationships between modulation time intervals and propagation times associated with base stations serving a same cell according to the invention. The language proposed for claim 10 is generic to these examples. Hence, Applicants respectfully submit that the amended claim language of claim 10 is fully supported by the original disclosure in accordance with the first paragraph of 35 U.S.C. §112.

Claims 10-14 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. Apart from the rejection based upon the presence of the term "audio" which was addressed above in response to the rejections under 35 U.S.C. §112, first paragraph, the Office Action indicated that the term "said

cell" in claim 12, line 2; claim 13, lines 9 and 14; and claim 14, line 7, lacks antecedent basis. With respect to claims 10, 12 and 14, these claims have been amended to address alleged antecedence imprecision with respect to the term "cell". With respect to claim 13, Applicants believe that the claim, as filed, complies with requirements of 35 U.S.C. §112, second paragraph. In particular, line 3 of claim 13 recites "a cell" whereas lines 9 and 14 recite "said cell" in reference to "a cell" as recited on line 3. Hence, Applicants believe that claim 13, as filed, satisfies the requirement.

For at least these reasons, Applicants respectfully submit that all the claims, as they now stand, satisfy the requirements of 35 U.S.C. §112, second paragraph. Reconsideration and withdrawal of the rejection of claims 10-14 are respectfully requested.

Claims 10, 11, 13 and 14 have been rejected under 35 U.S.C. § 103 as being allegedly unpatentable over the combination of U.S. Patent No. 4,490,830 to Kai et al. in view of U.S. Patent No. 4,852,090 to Borth. Prior to discussing this ground of rejection, a brief summary of Applicants' novel cellular radio communication system is provided to highlight some of the advantageous characteristics thereof.

The present invention relates to digital mobile radio systems in which message information is transmitted digitally to and from mobile stations by the transmission and reception of digitally modulated signals. In such systems, adaptive equalizers can be used to take advantage of the multi-path propagation of radio signals to improve signal quality. This stands in contrast to analog systems which have no equivalent of the equalizer and in which multi-path propagation acts as noise. Applicants discovered that this type of

system can have, for example, increased capacity if at least two base station transmitters are associated with each of a plurality of cells in which at least partially simultaneously transmit radio signals within the same frequency range that are digitally modulated with substantially the same message information to the mobile stations in the cell. The digital modulation used in this system is changed with a modulation time interval which is adapted to the greatest transmitting distance between two base station transmitters serving the same cell in an area.

One having ordinary skill in the art would understand the patent to Kai et al to disclose a system for reducing error rates in a data signal received in an overlapping coverage area served by two transmitters, where both the transmitters receive a same data signal for transmission. Kai et al achieve the purported error rate reduction by transmitting the data signal from one transmitter serving the overlapped area, and transmitting a phase delayed version of the same signal from the other transmitter. By introducing an appropriate phase shift in one of the data signals prior to modulation and transmission, Kai et al purport to reduce the error rate of the received signal in the overlapping coverage area.

The Office Action relies on Kai et al for teaching two transmitters on the same frequency transmitting substantially simultaneously into a cell with digitally encoded signals that are intended for mobile stations in the cell. However, by the Examiner's own admission, Kai et al fail to disclose Applicants' claimed modulation time intervals which are related to a time required for radio signals to propagate a distance corresponding to the greatest transmitting distance between two base stations associated with one cell in the

system, or a reception time interval that is at least as long as the time required for radio signals to propagate a distance corresponding to the greatest transmitting distance between two base stations associated with a cell. Hence, Kai et al, considered individually, clearly fails to teach or suggest the Applicants' claimed invention.

Thus, the Examiner relies on the Borth patent to remedy those deficiencies. One of ordinary skill in the art would understand Borth to disclose a time division multiple-access (TDMA) communication system wherein a transmitting station formats an equalizer synchronization word within a data message. A receiving station, upon receiving the message extracts the equalizer synchronization word within the data message and uses information from the equalizer synchronization word to adjust an adaptive equalizer to compensate for multipath characteristics of a channel. The equalizer uses the information derived from the equalizer synchronization word to compensate for distortions in the received signal due to intersymbol interference and/or Rayleigh fading by performing a continuous detailed comparison and measurement of the multipath characteristics, thereby equalizing the received signal in accordance with the measured characteristics.

The Office Action maintains that Borth provides "teaching that the modulation interval should be related to what applicant [sic] calls delay spread and the use of an equalizer in the receiver to reconstruct these delay spread signals". Applicants respectfully disagree with this contention. Applicants could not find any teaching or disclosure remotely suggesting or motivating Applicants' claimed modulation interval related to a time associated with a radio signal propagating from one or more base

stations to an associated cell, nor could Applicants locate any teaching, motivation, or suggestion of the recited reception time interval. Borth merely recites a system which uses equalizers in receivers involving the insertion of synchronization words in a transmitted message. Should the Examiner maintain this ground of rejection, he is respectfully requested to identify the specific portions of Borth which are being relied upon as teachings of Applicants' claimed modulation time interval and reception time interval.

The Office Action further maintains that since the multipath spread problems of Borth would be the same as the multipath problems in the systems of Kai et al, it would have been obvious to one of ordinary skill at the time to restrict the modulation time as taught by Borth and use his receiver for multipath reduction. Applicants respectfully disagree. As a first matter, Applicants submit that the patent to Borth is devoid of teaching regarding Applicants' claimed modulation time intervals and reception time intervals. Rather, Borth attempts to counter any multipath irregularities using an equalizer synchronization word inserted in a TDMA data message. The equalizer synchronization word is used to continuously measure, and thereby offset, multipath irregularities by adaptively adjusting an equalizer in the receiver. Kai et al, on the other hand, teach providing a selective phase delay in the transmission of a same signal from two transmitters in order to minimize data bit errors in an overlapped coverage area. Thus, no combination of Kai et al and Borth would have allowed one of ordinary skill in the art to arrive at Applicants' claim 10 combination.

For at least these reasons, Applicants respectfully request that the obviousness rejection based on the patents to Kai et al and Borth be reconsidered and withdrawn.

Claim 12 stands rejected under 35 U.S.C. §103 as being allegedly unpatentable over the aforementioned patents to Kai et al and Borth as applied to claim 10 above, further in view of U.S. Patent No. 2,745,953 to Young. This rejection is respectfully traversed. Young fails to remedy the shortcomings of the patents to Kai et al and Borth in obviating the Applicants' claim 10. One having ordinary skill in the art would have understood the patent to Young to disclose a communication scheme for reducing interference in overlapped base station coverage areas. Young teaches a system wherein separate transmission frequencies are assigned for transmission and reception in various mobile, base and receiving stations. There is no teaching, suggestion or disclosure of the modulation and reception time intervals recited in claim 10, from which rejected claim 12 depends. Hence, having failed to supply any additional teaching with which to remedy the shortcomings of the patents to Kai et al and Borth in obviating the invention as recited in claim 10, it can not be said that claim 10, or claim 12, would have been rendered obvious by the cited combination. For at least these reasons, Applicants respectfully request that the rejection based on the combination of patents to Kai et al, Borth, and Young be reconsidered and withdrawn.

In view of the Remarks provided above it cannot be said that the cited patents, whether considered individually, or in combination, would have rendered Applicants' claimed arrangement obvious to one having ordinary skill in the art. Hence, it is courteously urged that the rejections are untenable and are overcome.

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Entry of this Amendment, withdrawal of the rejections, and allowance of claims is deemed appropriate as it is believed that the application is in condition for allowance.

If the Examiner has any questions, he is invited to contact the undersigned at (703) 836-6642.

Respectfully submitted,

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